CBM Monitoring Summary
BLM-
MCFO

3/23/05

Summarized from MT-CBM ROD Monitoring Appendix							
Sub-Elements	**Item**	**Location**	**Technique**	**Frequency and Duration**	**Remedial Action Trigger**	**Management Options**	**Monitoring being Conducted**
AIR QUALITY							
	Gaseous and particulate critical air pollutants	area-wide	air quality modeling and ambient air samples	per standards	predicted or measured exceedances of NAAQS and/or PSD increments by MDEQ	implement additional emission controls or operating limits	Montana Department of Environmental Quality (MDEQ) is providing site specific air quality modeling for each POD, requiring an air permit. Air quality monitoring stations in the area are associated with municipalities, coal mines and other industry. The Interagency Working Group (IAWG)- Air Quality Task Group is assessing the existing monitoring network to determine additional monitoring needs. MDEQ has not predicted exceedences of National Ambient Air Quality Standard (NAAQS) or Prevention of Significant Deterioration (PSD) increments, and no exceedances of these increments have been detected by monitoring.
	Gaseous and particulate critical air pollutants	Birney/Ashland area	ambient air samples	before expanded development activity	before expanded development activity	implement additional emission controls or operating limits	Air quality monitoring is occurring with present stations in the area associated with municipalities, coal mines and other industry. The IAWG-Air Quality Task Group is assessing the existing monitoring network to determine additional monitoring needs. The MDEQ has not predicted exceedences of NAAQS or PSD increments, and no exceedance of these increments have been detected.

	Gaseous and particulate critical air pollutants	area-wide	emission inventory	annually	continuous	require submittal of annual reports	MDEQ is periodically conducting air quality modeling using the current emission inventory. The most recent version of this model was incorporated into the Fidelity Coal Creek EA. The MDEQ has not predicted exceedences of NAAQS or PSD increments and no exceedances of these increments have been detected.
CLIMATE							
	Bulk Precipitation	areas affected by land disturbance	RAWS or COOP Stations	daily during the growing season	extremes affecting revegetation operations		The weather stations are in operation and information is available.
CULTURAL RESOURCES							
	Areas of Critical Environmental Concern (ACECs)	area-wide	site inspection	annually	any noticeable trend indicating increased disturbance-natural or human-caused	increase frequency of monitoring to ensure ACEC values are not being impaired	There are 2 Cultural ACECs in Powder River RMP Area. Battle Butte and Reynold's Battlefield. Both are monitored annually by BLM. Monitored 2001-2004, Last Monitored 10/01/04. Downward trends have not been observed.
	20% of National Register eligible sites	CBM emphasis area	site inspection	annually	impacts to sites from unauthorized uses affecting qualities that make sites eligible for listing on National Register of Historic Places	halt activity affecting eligible sites. Increase monitoring of nearby eligible sites. Evaluate damage to sites.	Currently combined with random sample of 50 sites (see next item). Monitored in 2003 and 2004. Smaller than predicted number of sites recommended as eligible (8 of 218 recorded for CBM projects or 4% versus 10.5-15% predicted in FEIS). Additional work needed at most sites to determine eligibility (150 of 218). BLM also annually monitors one Cultural SMA (Yonkee Site) in CBM Emphasis Area, protocol follows ACEC Monitoring. No downward trends have been observed at eligible sites. Previous impacts at two site were mitigated through excavation.

	random sample of 50 sites	CBM emphasis area	site inspection	annually	any noticeable trend indicating increased disturbance-natural or human-caused	increase frequency and number of sites monitored, if sites are being impacted by CBM-related activities. Evaluate damage to sites.	80 previously recorded sites monitored and updated to current standards and 138 new sites recorded in 2003/2004. No downward trend observed related to CBM related activities. Some impacts from grazing and erosion noted at previously recorded sites, dating to the 1970's and early 1980's.
HYDROLOGY							
	Surface water quality and quantity	area-wide on major rivers or streams	Standard USGS quantitative measurements of water quality	Discharge measurements daily, water quality monthly	exceedance of any parameter above the state of MT surface water quality standards, including sodium adsorption ration (SAR), EC, or suspended sediments	report exceedance to MDEQ, who will determine if exceedance is because of natural (low flow) or human causes. If caused by CBM discharge, enforcement action be taken and/or Montana Pollution Discharge Elimination System permits modified.	BLM, along with the USGS and state and other federal agencies have participated in the creation of the Tongue River Surface-Water-Quality Monitoring Network. Details of this network can be found at: http://tonguerivermonitoring.cr.usgs.gov/index.htm. A report for the monitoring during 2004 in the Tongue River watershed has recently been completed by the BLM. The results of this analysis indicate the current surface water quality is not noticeably different from historical values.
							Monitoring stations on Rosebud Creek and the Powder River are being funded by the BLM, USGS, Northern Cheyenne, MDEQ, Montana Department of Natural Resources and Conservation (MDNRC), and Wyoming Department of Environmental Quality (WDEQ). Monitoring results for these stations can be found at http://waterdata.usgs.gov/mt/nwis/sw.

	Surface water quality and quantity	area-wide on major rivers or streams	Standard USGS quantitative measurements of water quality	Discharge measurements daily, water quality monthly	exceedance of any parameter above the state of MT surface water quality standards, including sodium adsorption ration (SAR), EC, or suspended sediments	report exceedance to MDEQ, who will determine if exceedance is because of natural (low flow) or human causes. If caused by CBM discharge, enforcement action be taken and/or Montana Pollution Discharge Elimination System permits modified.	The IAWG Hydrology Task Group has developed a Regional Surface Water Monitoring Plan. This plan can be viewed at http://www.wy.blm.gov/bfo/prbgroup/minutes.htm. Monitoring to date has not shown noticeable changes from historical conditions, and water quality standards have not been exceeded.
	Groundwater quality and quantity	area-wide in coal seams with potential for CBM development	Monitor groundwater levels in monitoring wells, and obtain water quality samples.	monthly to quarterly	a 5-foot decrease in static water level from seasonally adjusted mean static water level (determined during the first 3 years), or a significant shift in water quality from baseline conditions (determined from first 3 years of data) that impacts its beneficial use	if falling water levels are determined to be caused by CBM activity, operators must offer water well mitigation agreements to all landowners with wells in defined drawdown area (5 feet or greater drawdown) of their development. Hydrologic barriers, such as injection wells, may be an option in some cases to prevent drainage of Native American gas and water resources.	BLM coordinated with the Montana Bureau of Mines and Geology (MBMG) to conduct installation and monitoring of the observation well network. In 2004, 140 observation wells were included in this network. A year one report was prepared and is available at: http://www.mbmg.mtech.edu/pdf-open-files/mbmg508.pdf (Wheaton and Donato, 2004). This monitoring shows that "After 4 years of production from the CX field, water levels have been lowered by 20 feet at distances of less than 1 mile to as much as 2 miles outside the production area."

	Groundwater quality and quantity	area-wide in coal seams with potential for CBM development	Monitor groundwater levels in monitoring wells, and obtain water quality samples.	monthly to quarterly	a 5-foot decrease in static water level from seasonally adjusted mean static water level (determined during the first 3 years), or a significant shift in water quality from baseline conditions (determined from first 3 years of data) that impacts its beneficial use	if falling water levels are determined to be caused by CBM activity, operators must offer water well mitigation agreements to all landowners with wells in defined drawdown area (5 feet or greater drawdown) of their development. Hydrologic barriers, such as injection wells, may be an option in some cases to prevent drainage of Native American gas and water resources.	CBM operators are required to conduct groundwater monitoring under the Powder River Basin (PRB) Controlled Groundwater Area designation of the MDNRC. Monitoring reports for 2000 thru 2003 have been completed and submitted to the Technical Advisory Committee (TAC) by Fidelity E&P. Draft maps for Fidelity's 2004 report have been submitted to the BLM and the report will be finalized and submitted to the TAC by April 1, 2005. These reports show drawdown comparable to the MBMG report.

	Groundwater quality and quantity	area-wide in alluvium topographically down gradient from CBM discharges.	Monitor groundwater levels in monitoring wells, and obtain water quality samples.	monthly to quarterly	if static groundwater levels are naturally greater than 10 feet below ground surface, a rise in static groundwater levels to 10 feet below ground surface will be the trigger. If natural static groundwater levels are between 10 and 5 feet of the surface water, a 2-foot rise in water levels from seasonal baseline levels (determined from the first year of data) will be the trigger. If static groundwater levels are naturally within 5 feet of the surface, a 1-foot rise in water levels from seasonal baseline levels (determined from the first year of data) will be the trigger. A change in groundwater chemistry such that beneficial use of groundwater would be impacted, also will serve as a trigger.	if rises in groundwater levels are determined to result from CBM development, direct discharge of CBM water into waterways in watershed would cease until modified Water Management Plans (WMPs) are submitted and approved	Monitoring of alluvium is occurring adjacent to the Tongue River near Decker, on Rosebud Creek near the Northern Cheyenne boundary, and on Hanging Woman Creek. These data are available from the MBMG GWIC database at http://mbmggwic.mtech.edu/. Monitoring does not show changes in water levels or water quality in the alluvial aquifers.

	Groundwater quality and quantity	down gradient from impoundments	Monitor groundwater levels in monitoring wells, and obtain water quality samples.	monthly	a rise of 1-foot or more in static water levels above seasonally adjusted mean water levels (determined from the first year of data)	if the rise in water levels is determined to result from CBM activities, operators may be required to install additional monitoring wells further down gradient, or discharge into impoundments may be required to cease until a revised WMP is submitted and approved	The approval of the impoundments related to the Badger Hills POD required monitoring wells be installed adjacent to them. These are the only impoundments in MT approved for receiving produced water from Federal CBM wells. These impoundments have not been constructed since the rate of water production from the CX Field declined at greater than expected rate. As such, these wells have not been installed, and no monitoring results are available.
	Springs	along coal outcrops in the CBM development area	Monitor spring discharge and water quality parameters	quarterly to annually	a 50% decrease in spring discharge below seasonally adjusted mean (determined in the first 3 years), or a significant change in water quality that affects its beneficial use, or a change in the spring ecosystem from functional to nonfunctional	if decreased spring discharges or water quality are determined to result from CBM activity, operators must offer spring mitigation agreements to landowners who use the spring. If impacted spring is identified as important wildlife habitat, adaptive management practices will be used at the landscape level to improve spring ecosystems. Hydrologic barriers, such as injection wells, may be an option in some cases to prevent drainage of Native American gas and water resources	BLM, in coordination with other agencies, provided funding to MBMG to inventory and monitor springs. Reports related to this inventory have been prepared by MBMG (Open File Reports 493A and 493B). Monitoring is ongoing. Trend can not be determined based upon the current data.

INDIAN TRUST							
	Groundwater	Adjacent to Northern Cheyenne and Crow Reservations	Sample of Dedicated Monitoring Wells	6 times per year	where site-specific studies show a potential to affect Reservation groundwater, the Tribe would be consulted as to appropriate protection measures and if continuous monitoring shows a drawdown of groundwater that is attributed to CBM production	BLM would require the operators to modify federal CBM production. Mitigation options may include reducing production rates, shutting in the well or wells, establishing a hydrologic barrier, or providing compensation to the affected Tribe.	Monitoring wells have been installed adjacent to the Northern Cheyenne and Crow reservation boundaries. The results from the monitoring of these wells are shown in the Year One Groundwater Monitoring Report prepared by MBMG (Wheaton and Donato, 2004; http://www.mbmg.mtech.edu/pdf-open-files/mbmg508.pdf.) These monitoring results do not indicate any CBM related groundwater drawdown is reaching either the Northern Cheyenne or the Crow reservations (see Plate 3).
							The Northern Cheyenne, in cooperation with the USGS, have also installed monitoring wells along their southern border. The monitoring results for these wells are available from the USGS website at http://waterdata.usgs.gov/mt/nwis/gwsi. These results do not indicate any CBM related drawdown reaching the Northern Cheyenne reservation.
			monitoring wells in alluvium	monthly to quarterly	a 20% rise in the water table above its seasonally adjusted evaluation, or a 2 unit increase in the SAR value	Discontinuance of CBM evaporative ponds in that watershed, or required ponds to be lined	Monitoring of alluvium is occurring adjacent to the Tongue River near Decker, on Rosebud Creek near the Northern Cheyenne boundary, and on Hanging Woman Creek. Data is available from the MBMG GWIC database at http://mbmggwic.mtech.edu/. Monitoring does not show changes in water levels or water quality in the alluvial aquifers.

	Natural Gas	Area Wide	Drainage Evaluation	As needed	gas drainage	a communitization agreement, requiring operators to reduce production rates, shut-in wells, change spacing, or establish a hydrologic barrier to protect the Indian minerals from drainage	Drainage evaluations of Indian minerals have been conducted during the preparation of the EAs for each proposed project. To date, no potential drainage of Indian minerals has been identified. Therefore no drainage cases have been established.
LANDS AND REALTY							
	Rights-of-Way	Area-wide	Site Inspection	Minimum of once during or for construction within 2 years of issuance for MLA rights-of-way and within 5 years of issuance for FLMPA rights-of-way; then in the 20th year after issuance and every 10 years thereafter	nonuse of right-of-way or violation of right-of-way grant stipulations	require compliance with right-of-way grant stipulations with possible suspension and/or termination for noncompliance or nonuse	Rights-of-way are monitored according to schedule. No nonuse or violations of right-of-way stipulations have been observed.
MINERALS							
Oil and Gas	Geophysical NOI	Area-wide	Line or area inspection.	minimum of once during operations	violation of regulations, change from approved Notice of Intent, unnecessary or undue degradation	require operator to follow NOI	One Seismic application submitted and approved in Powder River Resource Area. Project inspection showed compliance with permit.

	Geophysical NOC	Area-wide	Line or area inspection.	minimum of once during plugging, once after reclamation	violation of regulations, change from approved NOC unnecessary or undue degradation	require operator to correct violation	One Notice of completion has been received, but no compliance inspection conducted yet.
	APD	Area-wide	site inspection	minimum of once and as needed	violation of regulations, change from approved Application for Permit to Drill	issue and incidence of noncompliance (INC) with timeframe to correct or shut-in drilling operations	A site inspection would determine compliance with the approved APD and applicable Onshore Orders. 405 APDs have been received, 251 have been approved, and 278 inspections have been conducted. No violations were observed.
	Sundry	Area-wide	site inspection	As needed	violation of regulations, change from approved Sundry Notice unnecessary or undue degradation	issue an INC with timeframe to correct	Sundry notices have been submitted for off lease measurement, changes in frequency of gas measurement and various other regulatory requirements. 358 have been received and 357 have been approved. No major violations have been observed during inspections.
	Natural Gas	Area-wide	drainage evaluation	As needed	if gas drainage is occurring, there would be a communitization agreement, drilling of protective wells on federal lands, or different spacing, to protect the federal minerals from drainage	certified letter to lessee requiring protection, compensation royalty, relinquishment	State and fee producing CBM wells, which offset federal or Indian minerals, create a potential drainage situation. This potential drainage is reviewed and if drainage is taking place, letters are written to lessees requiring protection of the federal or Indian minerals. 193 cases have been opened, 186 cases have been closed and 18 letters written to require protection of federal minerals.
Oil and Gas	Produced water Disposal	Area-wide	site inspection	minimum of once annually, or as needed	violation of regulations, change from approved permit, unnecessary or undue degradation	issue an INC with timeframe to correct or shut-in operations	Produced water has been part of the POD approvals. Monitoring requirements are those identified in the Hydrology - Surface Water Quality and Quantity Section.

	Spill	Area-wide	site inspection	minimum of once after event, and as needed	violation of regulations, change from approved permit, unnecessary or undue degradation	issue and INC and operator cleanup required	Company or BLM inspections would determine if a spill has occurred. No spills have been reported.
	Plugged and Abandoned	Area-wide	site inspection	minimum of once during operations	violation of regulations, change from approved permit, unnecessary or undue degradation	issue and INC correction required	Well plugging operations would be witnessed to ensure compliance with approved application. Only one violation was observed. INC and assessment issued to operator.
	Abandoned well Reclamation	Area-wide	site inspection	minimum of once and as needed until reclamation is complete	violation of regulations, change from approved permit, unnecessary or undue degradation	issue and INC/ certified letter requiring proper operator rehabilitation	A site inspection would be conducted to determine compliance with approved reclamation plan and determine success of reclamation. Inspections have been conducted at sites where the federal wells have been plugged and abandoned. Reclamation has been determined successful. Inspections of interim reclamation have been conducted. The operator has been notified of any corrective action that is needed.
PALEONTOLOGY							
	Pale ontological ACES and Significant Paleontological Localities	Area Wide	Assessment of Area Disturbed	Once Yearly	loss or damage to significant fossil resources	closure of areas surrounding site to prevent further disturbance to significant fossil resources	No Paleontological ACECs or Significant Paleontological Localities exist within area currently being developed for CBM. No Paleontological ACECs have been designated in Powder River RMP Area. Significant paleontological localities are monitored in the Powder River RMP area as part of Paleontological Permits or excavation requests.

RECREATION							
	general recreation use	area-wide with emphasis on dispersed use of undeveloped recreation sites	area inspections to look for vandalism, resource abuse, and install photo points	biannual (June and October), photograph annually	user conflicts, resource degradation, or safety hazards	avoid location of oil and gas facilities in undeveloped recreation sites having concentrated use, and coordinate timing of exploration activities to minimize conflicts during peak periods of use	Random patrols are conducted on a regular basis in order to monitor recreation pressure by location, type, and activity. Wilderness Study Areas (WSAs) receive monthly patrols during the field season. No user conflicts, resource degradation or safety hazards have been observed to date.
	concentrated recreation use	special recreation management areas, site with recreation facilities	visitor registration, traffic counters estimates, photo points	registration boxes and counters checked at least once monthly, photograph annually	increased visitor use per year or sustained use that requires additional or improved facilities	avoid location of oil and gas facilities in developed recreation sites having concentrated use, and coordinate timing of exploration activities to minimize conflicts during periods of use	Developed recreation areas receive frequent monitoring during maintenance visits to clean bathrooms, maintain signs/kiosks, and pick up litter. A noticeable increase in use or sustained use of recreation sites has not been observed.
	concentrated recreation use	area-wide commercial, competitive activities	administrative review, site inspections for complexes with permit stipulations	on site during competitive events, periodic site inspection for commercial operations, administrative review annually	irreparable resource damage, compromise of visitor safety, recreation experience	avoid location of oil and gas facilities in areas where know commercially permitted recreation activities are occurring and coordinate timing of exploration activities to minimize conflicts during peak periods of use	During the fall hunting season, patrols are conducted to make contact with commercial outfitters to substantiate compliance with conditions of their BLM permit. Neither irreparable resource damage, compromised visitor safety, nor compromise of the recreation experience has been observed.

SOILS							
	Soil erosion, uplands	area-wide where management activities are occurring or expected	Visual observation and surveyed erosion pins	quarterly	visual evidence of rill, gully, or sheet erosion. Loss of soil exceeding 10 tons per acre	report exceedance to BLM, MDEQ, or EPA. If caused by CBM discharge or activities, enforcement action will be taken.	Areas of development are examined when first proposed. Additional examinations occur when and if modifications are required to the Plan of Development. Once development occurs, the areas are examined on a regular basis to determine if erosion problems are occurring. This monitoring has not shown evidence of rill, gully or sheet erosion.
	Soil erosion, streambank and floodplain	area-wide on major rivers or streams	Visual observation and surveyed erosion pins	quarterly	a 10% increase in streambank loss	report exceedance to BLM, MDEQ, or EPA. If caused by CBM discharge or activities, enforcement action will be taken.	USGS was contracted to conduct the initial assessment, resulting in the document - *Channel-Morphology data for the Tongue River and Selected Tributaries, Southeastern Montana, 2001-02 (USGS Open File Report 2004-1260)*. Channel morphology data for these sites will be collected again in 2006. This method of monitoring is more economical and technically sound than quarterly visual observation. Since only one round of survey of channel morphology has been conducted, it is not possible to determine if increased rates of streambank erosion are occurring.
	Soil salinization	area-wide where management activities are occurring or expected	Visual observation and measurement of soil characteristics	quarterly	a 20% increase in conductivity levels	report exceedance to BLM, MDEQ, or EPA. If caused by CBM discharge or activities, enforcement action will be taken.	Applicants proposing areas for land application of CBM produced waters are required to conduct baseline monitoring of the soil characteristics and periodic monitoring thereafter to ensure adverse impacts are not occurring. No operations in which produced water is used for irrigation occurs in Montana at this time.

	Soil salinization	area-wide where management activities are occurring or expected	Visual observation and measurement of soil characteristics	quarterly	a 20% increase in conductivity levels	report exceedance to BLM, MDEQ, or EPA. If caused by CBM discharge or activities, enforcement action will be taken.	There are currently no LAD operation in Montana at this time, however the Montana and Wyoming BLM's along with the DOE are sponsoring a study of LAD sites in Wyoming. This work is being conducted by researchers at the University of Wyoming. This work will allow the fate and transport of native and applied salts to be determined.
							The Agronomic Monitoring and Protection Program (AMP) is being conducted to better understand the potential effects of CBM production on the soil and crops in the Tongue River drainage area. The AMPP was designed by Neal Fehringer, Certified Professional Agronomist; Kevin Harvey, Certified Professional Soil Scientist; and, Dr. Bill Schafer, Soil Scientist. Details concerning this monitoring can be found at: http://www.tongueriverampp.com/default.aspx. Data collected to date have not shown impacts to soils.
	Compaction	areas effected by development	Penetrometer or visual inspection	1 - 2 times per year	10% increase in density	limit or block access to compacted sites	Areas of Development are examined when first proposed. Additional examinations occur when and if modifications are required to the PODs. Once development occurs, areas are examined on a regular basis to determine if disturbance/compaction beyond the roads and pads is occurring. Monitoring has not indicated compaction issues are present.

VEGETATION							
	Ecological status	areas effected by development	ecological site method in key areas	1 - 2 times per year	status is reduced by 15% or a drop in class	ecological site integrity will be altered to increase status of ecological site index by 15% or an increase in ecological class	USDA's Natural Resources and Conservation Service Ecological Site descriptions are available for this area. During initial onsite visits, vegetative species occurring in the general vicinity of well locations are noted. Determinations related to the success of reclamation efforts cannot yet be made.
	Trend	areas effected by development	suitable methods from Technical Reference (TR) 4400-4 or National Range handbook	every 3-5 years after baseline data has been collected	a change in the direction of trend away from management	measure implementation of action put forth to mitigate reduction of ecological status using techniques listed in monitoring appendix for vegetative trend	Due to an insufficient amount of time, no determination as to vegetative trend can be made.
Noxious Weeds	Trend	areas effected by development	Montana Noxious Weed Standards	yearly	10% increase beyond objectives for the area/new species occurrence or infestation	operators will be required to contain and suppress noxious weeds. Conservation measures will be required in noxious weed sites to decrease population of noxious weeds and increase population of native plant community	The operators are responsible for monitoring/treating noxious weed infestations. When treatments occur, application records and maps must be submitted to the BLM. Increased frequency of noxious weeds have not been observed in the CBM area.

Riparian/ Wetlands	Condition, trend, age class structure, streambank alteration	riparian and wetland areas potentially impacted by CBM development	Appropriate methods from TR4400-3, TR4400-4, TR4400-7, TR1737-3, TR1737-8, or TR1737-9.	Based on activity, at least every 5 years.	trend away from objective or when no improvement occurs, in unsatisfactory habitat condition/functioning at risk with downward trend	oil and gas operators will be required to alter activities in order to provide environmental factors for increasing functionally or habitat conditions of the streams/wetlands. Oil and gas operators may be required to develop replacement wetlands in order to compensate for overall loss of wetlands according to Section 404 of Clean Water Act.	An analysis and report was completed by Confluence Consulting, Inc. for the BLM in 2003. Field work was completed during the summer of 2002. The analysis included the completion of Rapid Habitat Assessment forms and photos on streams within the Tongue and Rosebud drainages. These sites were reassessed by the BLM in 2004. Monitoring did not indicate habitat conditions associated with streams within the CBM development area were exhibiting a downward trend, or in an unsatisfactory habitat condition.
Special Status and T&E Plants	Condition	areas effected by development	Montana Natural Heritage Program and visual inspection.	Once during growing season.	downward trend in plant condition caused by oil and gas activities	oil and gas operators will be required to alter their activities in order to benefit special status or T&E plant species	In addition to information available from the Montana Natural Heritage Program, general visual inspections of the affected areas were made to assess potential habitat for plant Species of Special Concern. Affected areas are viewed periodically during range compliance checks or during rangeland monitoring activities. T&E Plants have not been observed in areas proposed for CBM activities.

WILDLIFE							
Aquatic Biological Diversity	population diversity	area-wide on major rivers or streams	stream sampling	every 3 years	downward trend overall stream biological diversity	reduction or elimination of untreated produced water into drainage or watershed	An analysis and report (for fish, macro-invertebrates, and periphyton) was completed by Confluence Consulting, Inc. for the BLM in 2003. Field work was conducted in 2002. Streams included Rosebud, Spring, Squirrel, Young's, Prairie Dog, Hanging Woman, and Corral Creeks. BLM re-sampled these sites in 2004. Data collected to date is not sufficient to determine if there is a downward trend in overall stream biological diversity. Sites are planned to be resurveyed in 2005.
Aquatic Biological Diversity	population diversity	area-wide on major rivers or streams	stream sampling	every 3 years	downward trend overall stream biological diversity	reduction or elimination of untreated produced water into drainage or watershed	FWP has completed fish population diversity and abundance surveys on the Tongue River, Rosebud, Young's, Hanging Woman, Waddle, Pumpkin, Little Powder River, and Spring Creeks in 2000 (for Tongue River only), 2003 & 2004. A final report has been completed for the 2000 survey. This report concluded that historically the Tongue River facilitated a considerable sauger migration for spawning, but recent years experienced little migrational movements. There is insufficient data to determine the cause of this change in sauger migration patterns. Trends in biological diversity are not apparent from this data at this time.

Aquatic Biological Diversity	population diversity	area-wide on major rivers or streams	stream sampling	every 3 years	downward trend overall stream biological diversity	reduction or elimination of untreated produced water into drainage or watershed	A baseline survey and report was completed in 2005 for amphibian and aquatic dependant reptile diversity in the CX field. The report was completed by Maxim Technologies. Baseline data is not sufficient to determine trend in biological diversity.
Aquatic Biological Diversity	population diversity	area-wide on major rivers or streams	stream sampling	every 3 years	downward trend overall stream biological diversity	reduction or elimination of untreated produced water into drainage or watershed	USGS and Tetra Tech have collected baseline aquatic biological information (periphyton, macro-invertebrates, bacteria) on different sites from 1999 to the present. These sites are located within the Tongue Powder River and Rosebud Creek drainages. This USGS information is located on the http://infotrek.er.usgs.gov/servlet/page website. The Tetra Tech data, collected for the development of TMDLs have not yet been published. The available baseline data is not sufficient to determine trends in biological diversity.
							USGS and FWP are currently conducting a study on the toxicity of the major salt (sodium bicarbonate) from CBM production on fish in the Tongue and Powder River drainages. A semi-annual progress report was completed in 2004. Provisional data presented in this report led to the conclusion that the sodium bicarbonate chronic toxicity (30 days) threshold for in fathead minnows is ~625 mg/L, and the acute toxicity (96-h LC50) threshold is ~5,526 mg/L.

Big Game	Seasonal Habitat Use	areas effected by development plus 1 mile buffer	air/ground field inspection	annually	downward trend in habitat occupancy	extension of timing stipulations or conditions of approval, off-site habitat management or enhancement	For all of the wildlife monitoring surveys listed below, BLM, USFWS, MTDFWP, USDAFS, and industry have created the Powder River Basin CBM-Wildlife Taskforce to direct wildlife survey efforts. CBM producers have conducted winter range observations for mule deer and pronghorns in 2005 only. Seasonal habitat use observations for elk have not been conducted. A cooperative survey between BLM, BIA, and the Northern Cheyenne Tribe surveyed big game over approximately 250 square miles on both sides of the southern border of the NCT reservation boundary. One year of baseline data has been collected for mule deer/pronghorns within current development. The baseline data collected included winter range use within identified winter range habitat. This is insufficient data to determine if a trend in habitat occupancy is occurring.
Black-footed Ferret	Occupancy	Prairie Dog towns >80 acres within 0.5 miles of development	ground inspection	determined per FWS coordination	habitat decline or prairie dog fatalities caused by oil and gas activities - occupancy of black-footed ferrets would be managed in a Black-Footed Ferret Management Plan	no incidental take; reinitiate consultation if new information shows it may be effected	Black-footed ferret surveys have been conducted by CBM producers within potential habitat as determined by USFWS protocol. Surveys determined black-footed ferrets do not currently occupy habitat within developed areas.

Burrowing Owl	Active nest locations	Prairie Dog towns within 0.5 miles of development	ground inspection	Twice per year	human-caused disturbance to owls related to oil and gas activities such as vandalism and harassment	extension of timing and/or increase of distance from nest; stipulations or conditions of approval	CBM producers have surveyed prairie dog towns for nesting burrowing owls. BLM also commissioned a separate survey to inventory prairie dog towns for burrowing owl on legally accessible lands. Three identified burrowing owl nests classified as active prior to/during development, were inactive in 2004.
Grey Wolf	Occupancy	Billings RMP area	air/ground field inspection	annually until reintroduction objectives are met	1- to 3-year downward trend in production or occupancy	no incidental take; reinitiate consultation if new information shows it may be effected	No CBM proposals in the Billings Field Office to date.
Migratory Non-Game Birds	Occupancy	Within 0.25 miles of development	ground inspection	periodically	documented fatalities caused by oil and gas activities	refinements in infrastructure planning (project plans), implementation of travel corridors, enhanced reclamation standards, and off-site habitat management or enhancement	BLM commissioned two separate breeding bird surveys within active and potential CBM production areas in 2001-2002. A cooperative, ongoing project with the USES, Univ. of Montana, and BLM is collecting data within potential CBM production areas. Data is available for 2002-2004. Insufficient data exists within developed areas to draw conclusions on effects of CBM to migratory bird species.
Mountain Plover	Active nest locations	areas effected by development plus 0.5 mile buffer	ground inspection	Twice per year	human-caused disturbance to mountain plovers related to oil and gas activities such as vandalism and harassment	BLM received an exemption from the prohibitions of Section 9 of SEA regarding take by agreeing to terms and conditions in biological opinion (BO). Incidental take of habitat and individuals allowed up to level stated in BO. Take must be monitored. Reinitiation of Section 7 will occur before allowable take is exceeded.	CBM producers surveyed prairie dog towns for mountain plover nests. BLM also commissioned a separate survey to inventory prairie dog towns for mountain plover on legally accessible lands, as well as evaluated potential habitat to determine in preferred habitat exists for mountain plover. Surveys determined mountain plovers do not currently occupy habitat within active or potential CBM development areas.

Prairie Dog	Active Prairie Dog Colony	areas effected by development plus 0.5 mile buffer	air/ground field inspection	annually	documented prairie dog fatalities caused by oil and gas activities	establishment of no surface occupancy zones and/or establishment of timing restrictions within prairie dog towns	CBM producers survey active prairie dog colonies annually. BLM also commissioned a separate survey in 2004 to document prairie dog colonies in Powder River, Rosebud, and Bighorn Counties. Monitoring data is insufficient to determine if any impacts of CBM development on prairie dogs/habitats has occurred.
Raptors	Active nest locations	areas effected by development plus 1 mile buffer	air/ground field inspection	every 3 years	downward trend in occupancy	extension of timing and/or increase in distance from nest; stipulations or conditions of approval	CBM producers survey for raptor nest locations as development areas)PODs) are submitted. In 2004, BLM commissioned a separate survey to inventory raptor nests within an area with CBM potential. Three years of raptor nest activity monitoring has occurred. Of 16 raptor nests classified as active in 2002, nine remained active in 2004. Of the 23 active nests in 2003, 11 remained active in 2004. Of the 25 inactive nests found in 2002, four were classified active in 2004.
	Raptor Productivity	areas effected by development plus 1 mile buffer	air/ground field inspection	annually	downward trend in nest success, overall productivity	extension of timing and/or increase in distance from nest; stipulations or conditions of approval	CBM producers surveyed nests for activity only and have partially documented productivity. The separate survey commissioned in 2004 by the BLM identified productivity of nests at the time of the survey. Insufficient productivity monitoring data exists to make conclusions.
	Raptor Productivity-Undeveloped areas	area-wide	air/ground field inspection	every 5 years	information used as support to determine downward trend	extension of timing and/or increase in distance from nest; stipulations or conditions of approval	A BLM commissioned survey in 2004 identified productivity of nests at the time of the survey. The survey area partially covered potential CBM production area. With only baseline information existing, conclusions cannot be made at this time.

Sage Grouse	Lek Locations	area-wide	aerial field inspections	every 5 years	downward trend in habitat occupancy	extension of timing and/or increase in distance from lek; stipulations or conditions of approval; off-site habitat management/mitigation	Comprehensive lek surveys were completed by the BLM in 2000 in habitat within potential CBM areas. Surveys were conducted in another potential CBM area in 2003. CBM producers conduct surveys of locations annually within developed areas. Insufficient data exists to make conclusions.
	Lek Attendance	areas effected by development plus 2 mile buffer	air/ground field inspection	annually	downward trend in lek attendance	extension of timing and/or increase in distance from lek; stipulations or conditions of approval; off-site habitat management/mitigation	CBM producers conducted monitoring for activity within development areas. BLM also surveyed known leks for activity in 2000-2003. A cooperative study with Department of Energy (DOE), University of Montana, and BLM has resulted in the survey of leks, several times a year. Insufficient data exists to make conclusions. Results from this study will be published in late 2005/early 2006.
	Winter Habitat	areas effected by development plus 2 mile buffer	air/ground field inspection	annually	downward trend in habitat occupancy or quality caused by oil and gas activities	extension of timing and/or increase in distance from lek; stipulations or conditions of approval; off-site habitat management/mitigation	Winter habitat surveys were completed in 2002-2003 by BLM and MTDFWP. A cooperative study with DOT, University of Montana and BLM has tracked winter habitat use within a CBM development area. CBM producers have not surveyed for sage grouse winter habitat areas. Insufficient data exists to make conclusions.

Special Status Animals	Occupancy	areas effected by development plus 1 mile buffer	ground field inspections	annually at a minimum via species habitat requirements	downward trend in habitat occupancy or quality caused by oil and gas activities	establishment of timing and/or distance from breeding area through stipulations or conditions or approval	Annual surveys have been conducted for terrestrial Special Status Species within developed areas. Some Special Status Species (including bats and some songbird species) surveys do not occur annually, although observations of wildlife species are normally documented when observed during other surveys. Baseline survey data is insufficient to make conclusions.
Special Status Animals	Occupancy	areas effected by development plus 1 mile buffer	ground field inspections	annually at a minimum via species habitat requirements	downward trend in habitat occupancy or quality caused by oil and gas activities	establishment of timing and/or distance from breeding area through stipulations or conditions or approval	Special Status amphibians and reptiles were surveyed in FY-2004 (refer to Aquatic Biological Diversity). Sauger has been surveyed by a variety of agencies (refer to Aquatic Biological Diversity). This baseline data is not sufficient to determine the trend in herptile habitat occupancy. Historical data indicates the Tongue River facilitated a considerable sauger migration for spawning, but in recent years there appears to be little migration activities. There is insufficient data to determine the cause of this change in sauger migration patterns.
T&E Animals	Occupancy, Productivity	area-wide	air/ground field inspection	determined per FWS coordination	habitat decline or fatalities caused by oil and gas activities; occupancy of species would be managed in a site-specific Management Plan	reinitiate section 7 consultation with FWS	Bald Eagle surveys are the only T&E species known to occupy habitat within this area. Bald eagle winter roosts, nests, and productivity are surveyed annually by CBM producers, BLM, and MTDFWP. No change in bald eagle nest activity has occurred.